Environmental Flows
A Natural Approach
Fundamentals

• Organisms have evolved and are adapted to environmental conditions including their variability.

• Estuarine inflows are highly variable and thus the estuary is also variable for many parameters.

• Therefore, many estuarine organisms are going to be tolerant of this variability especially that associated with salinity.
Where we seem to be

• Despite much effort and work, the relationship between productivity and salinity within the bay for recreational and commercial species is not strong.

• Should we be attempting to treat the bay analogous to a reaction vessel in a chemical plant with so much variability?

• There are organisms and biological communities that have not been examined with the same level of effort.
• The bay and the watershed have experienced extremely dry periods and extremely wet periods based solely on what nature provides.
• In determining inflows, salinity is an acceptable surrogate tool, however, other changes in the bay affect salinity not just inflow.
• Despite the value that a historical analysis plays in understanding flow regimes and past patterns, it is ultimately rainfall that determines flow into streams and the estuary.
Basics of what we think

• Ensuring that the bay receives the expected patterns of flow should maintain the integrity of the ecosystem.

• Ensuring that the bay receives the expected patterns of flow given the weather conditions at that time should maintain the integrity of the ecosystem.
Natural Flow

• This is based on the premise that biological community is adapted to these conditions and that within certain boundaries organisms are adaptable.

• Therefore, only the human induced deviations from natural flow conditions are of concern and these values can be positive or negative.

• How can we know what that difference is?
Natural Flow

• We can add real-time return flows and subtract real-time diversions. That may work for instream flows. We can then add them back in and determine what the difference is. This difference is what we should concern ourselves with.

• What about reservoirs? Our starting time should be today but we have to account for their effect; delays, leakage, etc.
Natural Flow

• The key to incorporating the ability to do this is to incorporate precipitation into our modeling efforts.

• Precipitation is the fundamental driver of instream flow and estuarine inflow.
Precipitation
November 2008
Advantages

• Approach is independent of other factors that affect salinity; the surrogate of choice, e.g. navigation improvements and other bay structures.

• Flow is independent of future trends or changes in weather patterns. Climate changes.
Advantages

• If we were able to estimate what this difference between “natural” flows and human induced flows in near real time, we would be in a position to:
  • Use adaptive management – monitor outcomes.
  • Know what choices the stakeholders will be making.
  • Provide better assessments for instituting conservation measures.
  • assess the magnitude of change,
  • address cumulative effects,
  • and ameliorate negative effects responsibly.
Downsides

• It would require a more constant assessment – monthly model runs, etc.
• Would have to revise models that currently exist whether we use runoff models or USGS models.
• Cannot do within timeline we are working under.
• We would still have to play Solomon with providing for multiple needs. However, we would be making choices with some degree of knowledge and the ability to assess the consequences.
Biology Is Important